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IX. *Observations of a Solar Eclipse, October 27, 1780, made at the University in Cambridge. Communicated by CALEB GANNETT, A. M. Rec. Sec. Amer. Acad.*

ON several days previous to the eclipse, I carefully took corresponding altitudes of the sun, with an excellent *Hadley's* quadrant. The agreement between the observations was such, that those taken on the two immediately preceding days, express the result of the whole. They were as follow :

Oct. 25, A. M.	P. M.		
8h 59' 19"	2h 50' 1"	Hence, at app. noon the clock was	11h 54' 40"
8 56 1	2 53 11	Interval	5 57 40
8 52 10	2 57 18	$\frac{1}{2}$ ditto	2 58 50
		Equation of $\frac{1}{2}$ intervals	+ 16
Sum, 26 47 30	8 40 30		11 54 56
Mean, 8 55 50	2 53 30		
		Clock flow of sun,	5 4

  

Oct. 26, A. M.	P. M.		
8 48 1	3 1 18	Hence, at app. noon the clock was	11 54 36
8 52 11	2 57 1	Interval	5 56 8 36"
8 56 47	2 52 23	$\frac{1}{2}$ ditto,	2 58 4 18
9 0 58	2 48 11	Equation of $\frac{1}{2}$ interval	+ 16
9 4 42	2 44 29		
Sum, 44 42 39	14 23 22		11 54 52
Mean, 8 56 31 48"	2 52 40 24"	Clock flow of sun,	5 8

On the 27th, observations were taken in the morning ; but the atmosphere was so loaded with vapour, as to prevent the taking of any, with accuracy, in the afternoon.

From the above observations it appears, that between the 25th and 26th of October, the clock gained on mean time 2". Hence, on the 27th, at apparent noon, the clock was flow of the sun 5' 11". Two common brass reflecting telescopes were used upon the occasion, each magnifying about 60 times ; also,

an achromatic, made by *Dolland*, it's magnifying power 90. The Reverend Professor *Wigglesworth* and Mr. *John Mellen*, used two of the telescopes. Mr. *Mellen* observed with the achromatic.

The observers were so unfortunate as not to perceive the beginning of the eclipse. They supposed the shadow would have entered the sun's disc more westerly than it did.—They therefore attended to a different part of the sun's limb. To prevent a similar error in future, it might be well, previously, to determine the point at which an eclipse will commence. This may be done by calculating the angle, which the ecliptic will make with a vertical circle passing through the centre of the sun, at the time the eclipse begins.

The observations were as follow, viz.

	Observers, <i>Wigglesworth</i> .			<i>Gannett</i> .			<i>Mellen</i> .			Mean of obs.		
	h. ' "			h. ' "			h. ' "			h. ' "		
First contact of N. W. spots, } Plate II. Fig. VI.	11	20	57				11	21	3	11	21	0
Total obscuration of ditto,	11	25	15				11	25	36	11	25	25½
First cont. of N.E. spots, No. 1,	11	31	36	11	31	53	11	31	38	11	31	42½
2,				11	33	4				11	33	4
3,				11	33	54				11	33	54
Total obscuration of	4,	11	34	52			11	34	58	11	34	55
First cont. of central spot,	11	35	26	11	35	30	11	35	30	11	35	28½
Total obscuration of ditto,	11	36	19	11	36	4	11	36	14	11	36	12½
First cont. of S. E. spot,				12	13	47	12	13	47	12	13	47
Total obscuration of ditto,				12	14	3	12	14	4	12	14	3½
Total emerfion of N.W. spots,	12	29	28							12	29	28
First app. of N.E. spots, No. 1,	12	52	56	12	52	33	12	52	31	12	52	36½
2,				12	53	27				12	53	27
3,				12	54	9				12	54	9
Total emerfion of	4,	12	55	23			12	56	4	12	55	43½
First app. of central spot,				12	56	11				12	56	11
Total emerfion of ditto,	12	56	47	12	56	45				12	56	46
First app. of S. E. spot,				1	33	51	1	33	47	1	33	49
Total emerfion of ditto,	1	34	1	1	34	5				1	34	3
End of the eclipse,	1	39	51	1	39	47	1	39	50	1	39	49½
Digits eclipsed, about 11½.												

The observers not being possessed of a micrometer, Mr. *Wigglesworth* made use of the following expedient to determine

the quantity of the eclipse.—He described on paper a number of circles, dividing a common diameter into digits. The paper was placed perpendicular to a telescope, through which the sun's rays were received upon it. Accuracy is not pretended in this method. The quantity noted, is the nearest that could be estimated by it.

Through want of cross wires in either of the telescopes used, the precise situation of the spots, on the sun's disc, could not be determined. In the figure, their relative situation is marked, according to judgment at the time.

